

Revision of the Genus *Trichopepla* (Hemiptera:Pentatomidae) in N. America

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Abstract: A diagnosis is given for the genus *Trichopepla*; an identification key and descriptions are provided for seven species.

Trichopepla is closely related to the genus *Holcostethus*. In both genera pseudoclaspers are found within the genital cup of the male. They are smaller in *Trichopepla* and generally hidden at the base of the claspers. The spermatheca, however, is very aberrant in this genus (McDonald, 1966). All species have a very simple sac-like spermatheca, which in some species possesses a terminal appendix. This is one of the simplest type of pentatomoid spermatheca. While *Holcostethus* and *Trichopepla* have pseudoclaspers, the spermatheca of all species of *Holcostethus* unlike *Trichopepla* is typically pentatomoidean. Pseudoclaspers and normal pentatomoid spermathecae also characterize the genus *Carpocoris* (Tamanini, 1958).

It is probable that *Trichopepla* is a fairly ancient genus in which the spermathecal pump has not yet developed or is represented by the terminal appendix found in some species. It will be interesting to note if other pentatomoid genera possess either a simple spermatheca or an intermediate form between the simple type and the more complex pump found in most pentatomoids.

Key to the species of *Trichopepla* in N. America

1. Head distinctly elongate, tapering apically, ratio of width between eyes to length (apex to line across base of eyes) 1:1.3, dorsal surface often densely pilose; pseudoclaspers with numerous stout spines on surface (Fig. 4) *semivittata* (Say)
Head broadly rounded or truncate apically, ratio of width to length 1:1 or less, dorsal surface with a few hairs; pseudoclaspers with a few lateral spines at most 2
2. Pronotum distinctly impressed behind anterolateral margins; small species generally

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- less than 4 mm wide (across lateral angles of pronotum) and 8 mm long (apex of head to apex of wing membrane) 4
- Pronotum not impressed behind anterolateral margins, prothorax smoothly rounded to margins; larger species over 4 mm wide and 8 mm long 3
3. Connexiva with a continuous light brown or yellow margin; tip of scutellum generally pale yellow; base of pronotum and coria concolorous with dorsal surface *grossa* Van Duzee
- Abdominal connexiva with alternating pattern of black and light brown, sometimes faint, in which case the connexiva are uniformly amber; tip of scutellum concolorous; base of pronotum and coria often roseus *aurora* Van Duzee
4. Buff or brown species with 3 distinct broad longitudinal yellow stripes alternating with black on basal half of scutellum *vandykei* Van Duzee
- Scutellum concolorous or at most with a thin median yellow stripe and yellow spots in anterolateral corners 5
5. Abdominal spiracles distinctly margined with dark brown or sternites uniformly fuscous around spiracles; females over 4 mm wide and 8 mm long; males with small pentagonal pseudoclaspers (Fig. 13) *atricornis* Stål
- Abdominal spiracles same color as sterna or at most with a very narrow pale brown ring around the spiracular rim; females smaller than above; males with more elongate leaf-like pseudoclaspers (Figs. 28, 43) 6
6. Lateral angles of pronotum broadly rounded (Fig. 39); head apex bluntly rounded; dorsal margin of pygophore with a deep median U-shaped emargination flanked by protuberances on each side (Fig. 41) *pleyto* Van Duzee
- Lateral angles of pronotum more angulate (Fig. 23); head truncate apically; dorsal margin of pygophore with a very shallow U-shaped emargination (Fig. 25) *dubia* (Dallas)

Trichopepla Stål

Trichopepla Stål, 1867, p. 528; Van Duzee, 1904, p. 34; Kirkaldy, 1909, p. 49; Zimmer, 1912, p. 221; Van Duzee, 1917, p. 33; Blatchley, 1926, p. 107; Froeschner, 1941, p. 127.

Type species. Pentatoma pilipes Dallas, 1851 (= *semivittata*)

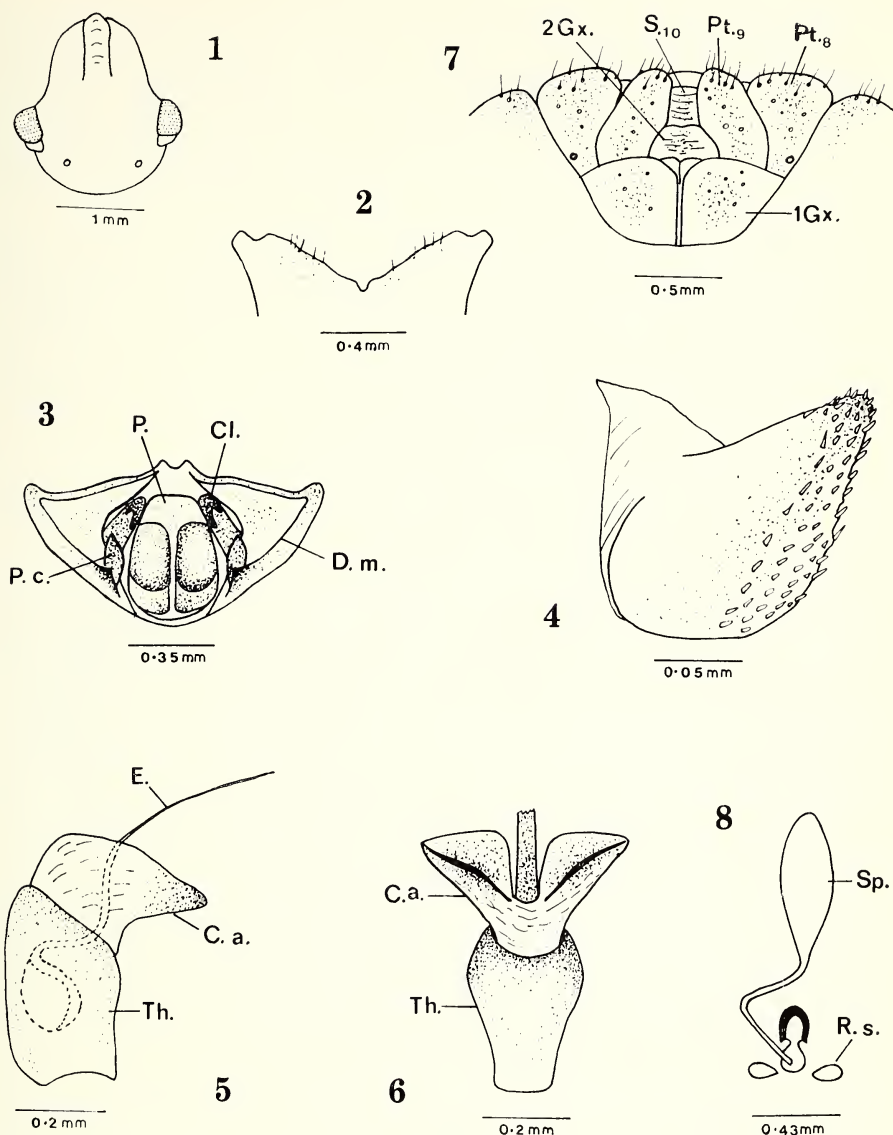
Generally small brown pilose species. 5–9 mm long (tip of head to apex of membrane) and 3–5 mm wide (across lateral angles of pronotum). Head with jugae equal to or slightly longer than tylus; apex of head truncate, bluntly rounded or distinctly tapered; bucculae elongate, narrow, extending almost the full length of head, anteriorly truncate, posteriorly bluntly rounded; apex of rostrum generally reaching hind coxae. Pronotum trapezoidal, lateral angles bluntly rounded, anterior angles acute. Pro- and mesosternum bearing a small flattened central ridge. Odoriferous gland opening with short sulcus extending $\frac{1}{4}$ to $\frac{1}{2}$ (*T. grossa* Van Duzee) distance to lateral margin, apically tapering or rounded; evaporative area narrow cephalad and caudad of sulcus on metapleuron (area somewhat larger in *T. grossa*).

Scutellum apically narrowed and bluntly rounded abdominal sterna without spine.

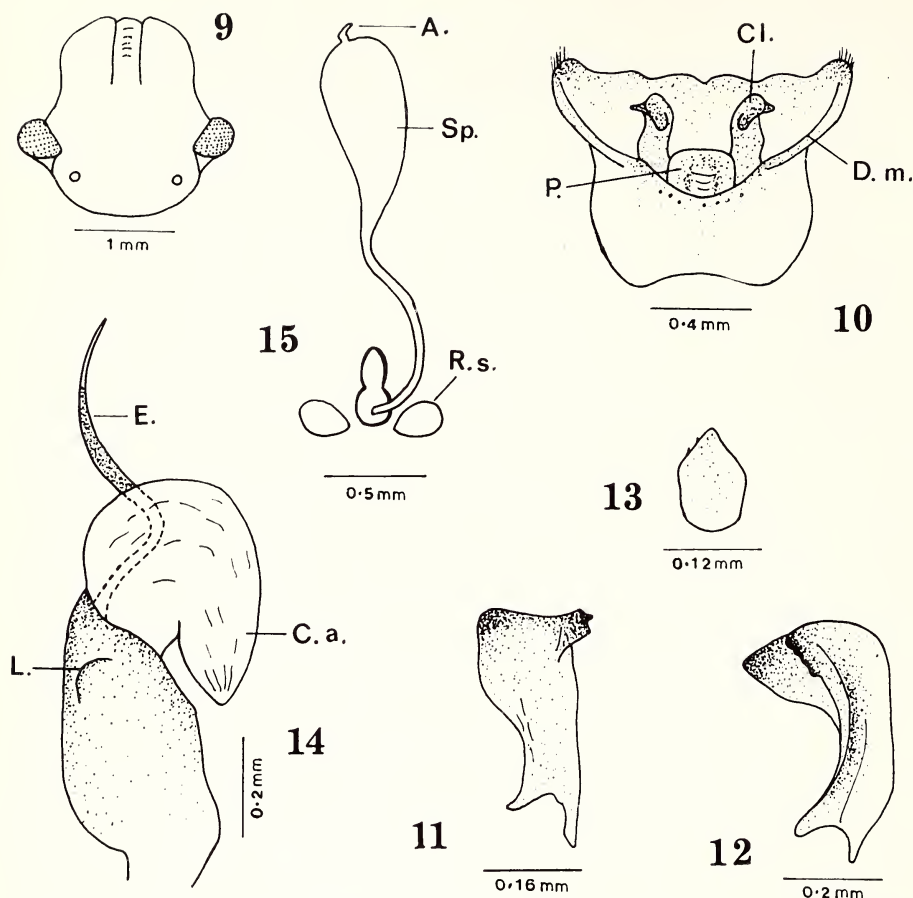
Male genitalia. Pygophore bearing small leaf-like pseudoclaspers comparable to those found in *Holcostethus* (McDonald, 1974). Claspers C-shaped, broadened and flattened apically.

Aedeagus with one pair of membranous conjunctival appendages; endophallic duct long, sinuous and tapering to a fine point.

Female genitalia. External genitalia plate-like; eighth paratergites with spiracles; spermatheca a simple sac with or without a small terminal appendix; ring sclerites present on either side of spermathecal opening, latter surrounded by U-shaped sclerite.



FIGS. 1-8. *T. semivittata*. 1. Head, dorsal view. 2. Ventral margin of pygophore. 3. Pygophore, dorsal view. 4. Left pseudoclasper. 5. Aedeagus, lateral view. 6. Aedeagus, ventral view. 7. Female genitalia. 8. Spermatheca. Conjunctival appendage (C. a.), clasper (Cl.), dorsal margin (D. m.), endophallic duct (E.), gonocoxae 1 and 2 (1, 2 Gx.), proctiger (P.), pseudoclasper (P. c.), paratergites 8 and 9 (Pt. 8, 9), ring sclerite (R. s.), sternum 10 (S. 10), spermatheca (Sp.), Theca (Th.).



FIGS. 9-15. *T. atricornis*. 9. Head, dorsal view. 10. Pygophore, dorsal view. 11. Left clasper, outer view. 12. Left clasper, lateral view. 13. Left pseudoclasper. 14. Aedeagus, lateral view. 15. Spermatheca. Appendix (A.), endophallic duct (E.), first and second gonocoxae (1, 2 Gx.), lateral projection (L.). Other lettering as in previous diagrams.

Trichocheila semivittata (Say, 1832)

Trichocheila semivittata Stål, 1867, p. 528, Uhler, 1871, p. 96; Stål, 1872, p. 34; Uhler, 1878, p. 374; Distant, 1890, p. 64; Van Duzee, 1904, p. 34; Kirkaldy, 1909, p. 49; Zimmer, 1912, p. 224; Van Duzee, 1917, p. 33; Blatchley, 1926, p. 107; Froeschner, 1941, p. 129; McDonald, 1966, pp. 19, 52 (Genitalia).

Pentatoma semivittata Say, 1832, p. 9; Say, 1869, p. 322; Walker, 1868, Vol. 3, p. 559.

Pentatoma semivittatum Herrich-Schaeffer, 1844, Vol. 1, p. 107, fig. 766.

Pentatoma pilipes Dallas, 1851, p. 247.

Colour and colouration very variable, generally light to dark brown or rubescent with black and cream markings. Head with 3 distinct cream or light brown longitudinal stripes alternating with black or dark brown. Upper surface often densely setose, setae long.

Head distinctly tapering apically (Fig. 1), ratio of width (between eyes) to length (apex of head to line between base of eyes) 1:1.3. Antennal segments 1 and 2 pale brown, remainder may be same colour or dark brown. Anterolateral margins of pronotum slightly impressed submarginally. Connexiva generally with alternating pattern of yellow and black squares along margins, sometimes connexiva uniformly fuscous.

Male genitalia (Figs. 2-6). Described by McDonald (1966). Pseudoclaspers termed genital plates by McDonald (1966), leaf-like and covered with stout spines (Fig. 4).

Female genitalia (Figs. 7-8). Described by McDonald (1966). Ring sclerites present on either side of spermathecal opening not noted in previous description. A stout U-shaped sclerite present around spermathecal opening. Spermatheca sac-like (Fig. 8) with or without a small terminal appendix. The appendix is generally absent in this species.

Type. Not located.

Distribution. Throughout southern Canada, U.S.A. and northern Mexico.

Trichopepla atricornis Stål, 1872

Trichopepla atricornis Stål, 1872, p. 34; Uhler, 1877, p. 403; Van Duzee, 1904, p. 35; Kirkaldy, 1909, p. 49; Van Duzee, 1917, p. 34; Blatchley, 1926, p. 108.

Very similar in colouring to *T. semivittata*, usually dark brown in general appearance. Head truncate apically (Fig. 9), ratio width (between eyes) to length (apex of head to line between base of eyes) 1:1. Antennal segments all uniformly dark brown. Pronotum larger with anterolateral margins more convex than in *T. semivittata*. Connexiva generally with a continuous pale margin, sometimes uniformly dark brown.

Male genitalia (Figs. 10-14). Pygophore and claspers (Figs. 10-12) similar to *T. dubia*. Pseudoclaspers (Fig. 13) hidden below dorsal margin, small, apically tapered and with one or two minute marginal spines. Aedeagus (Fig. 14) similar to *T. dubia*.

Female genitalia. External genitalia similar to *T. semivittata*; spermatheca (Fig. 15) sac-like, generally with a small terminal appendix.

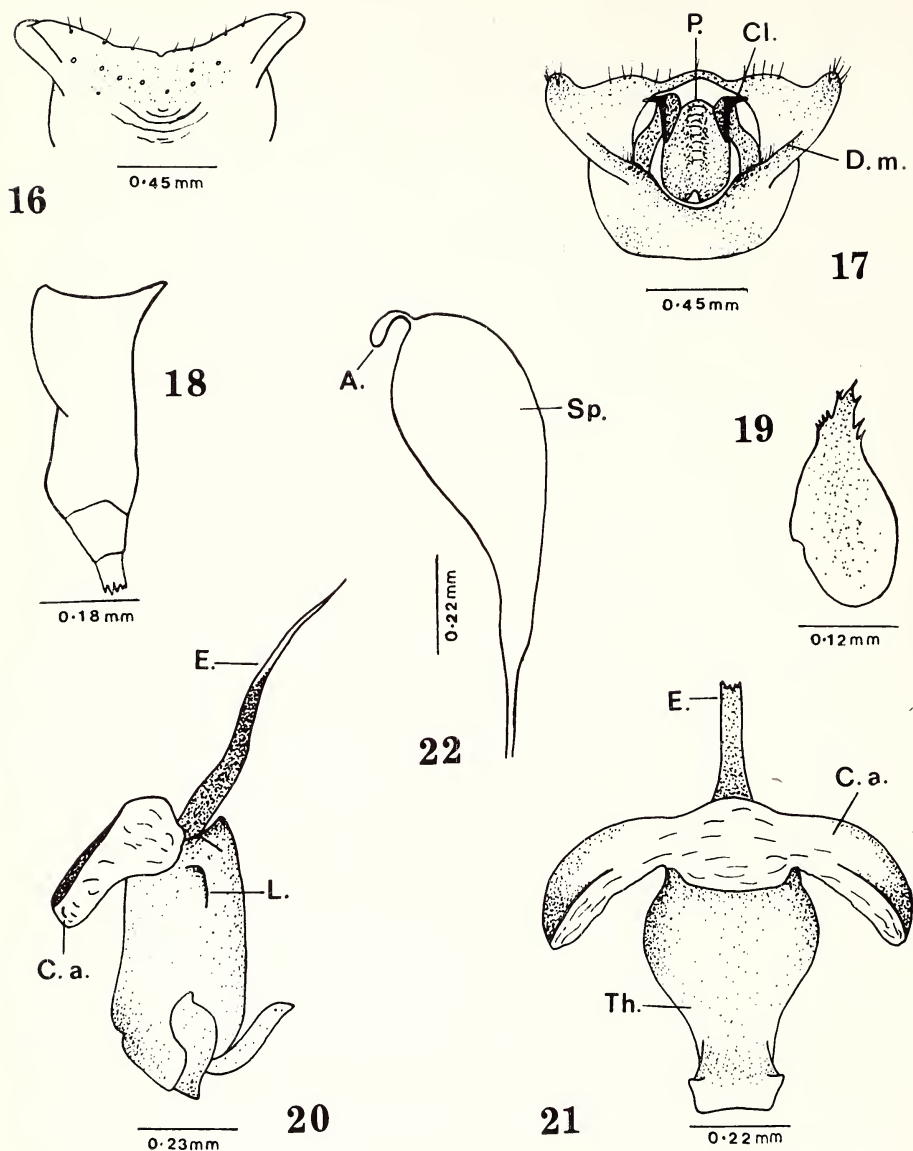
Type. From the syntype series the following specimen is designated as the lectotype: ♀ Illinois, Belfrage (labels reading Type and Paratypus attached) No 425/74, Naturhistoriska Riksmuseet, Stockholm: 4 remaining specimens are designated paralectotypes; ♀ Illinois, Belfrage (labels reading Type, *atricornis* Stål, Typus attached) No 423/74; ♀ Illinois, Belfrage (labels reading Type, Paratypus attached) No 424/74; ♀ Illinois, Belfrage, (labels reading Type, Paratypus attached) No 426/74; ♀ Wisconsin, Kumlien (labels reading Type, Paratypus attached) No 427/74.

Distribution. Illinois, Wisconsin, Colorado, Montana, California, British Columbia, Alaska, Oregon, Ohio.

Trichopepla aurora Van Duzee, 1918

Trichopepla aurora Van Duzee, 1918, p. 273.

Upper surface sparsely setose, setae short. Base of pronotum and coria often roseus. Head bluntly rounded apically, ratio of width (between eyes) to length (apex of head to line between base of eyes) 1:1. Anterolateral margins of pronotum not impressed behind. Scutellum, ratio of width (at base) to length 1:1.1. Frena well above halfway on scutellar margins.



FIGS. 16-22. *T. aurora*. 16. Ventral margin of pygophore. 17. Pygophore, dorsal view. 18. Left clasper, outer view. 19. Left pseudoclasper. 20. Aedeagus, lateral view. 21. Aedeagus, ventral view. 22. Spermatheca. Lettering as in previous diagrams.

Male genitalia (Figs. 16-21). Pygophore. Ventral margin (Fig. 16) sinuous, slightly convex; dorsal margin broadly arched (Fig. 17); proctiger oblong box-like. Claspers (Fig. 18) C-shaped, apex broadened and flattened. Pseudoclaspers (Fig. 19) elongate, flattened, with a number of marginal setae. Aedeagus similar to *T. dubia*.

Female genitalia. External genitalia similar to *T. semivittata*. Spermatheca sac-like (Fig. 22) with or without a terminal appendix.

Type. Holotype. California Academy of Sciences: ♂ Eldorado, Co. Cal. V1. 30.13 Coll. by F. W. Nunenmacher. Paratypes: ♀ Gallatin Co. Mont. Elev. 7500 Col. E. Koch, 6/22 1900; ♂ Eldorado Co. Cal. V1. 20.13 Coll. by F. W. Nunenmacher. Type examined.

Distribution. California, Montana, Oregon, Colorado, Washington.

Trichopepla dubia (Dallas, 1851)

Pentatoma dubia Dallas, 1851, p. 237.

Peribalus dubius Van Duzee, 1904, p. 34.

Holcostethus dubius Kirkaldy, 1909, p. 49.

Trichopepla californica Van Duzee, 1918, p. 272.

Trichopepla klotzi Ruckes, 1937, p. 2.

Trichopepla dubia NEW COMBINATION.

Note. *Trichopepla dubia*, Distant, 1890, Biol. Cent. Amer. Het. 1, p. 333 is a junior synonym of *Euschistus integer* Stål (L. H. Rolston, personal communication).

Small brown species often speckled with black, moderately setose on upper surface; setae long. Ratio of head width (between eyes) and length (apex of head to line between base of eyes) 1:1; head truncate or bluntly rounded apically. Anterolateral margins of pronotum distinctly impressed submarginally, lateral angles slightly acute (Fig. 23). Scutellum concolorous or at most with a fine central yellow stripe and a yellow spot in the basal angles; ratio of width (at base) to length 1:1; frenum extending almost halfway along scutellar margins. Apex of odoriferous gland sulcus rounded and raised above metasternum.

Male genitalia (Figs. 24–30). Pygophore. Ventral margin (Fig. 24) broadly emarginate with a median notch. Dorsal margin (Fig. 25) with a shallow central emargination. Claspers (Figs. 26, 27) C-shaped, flattened and broad at apex. Pseudoclaspers (Fig. 28) small, leaf-like, with one or two small spines on lateral margins. Aedeagus. Theca vasiform (Fig. 29), a lateral protuberance found on each side near margin; conjunctival appendage conical, sac-like with a ridge of sclerotization on dorsal surfaces (Fig. 30); endophallic duct elongate, sinuous.

Female genitalia. External genitalia and spermatheca similar to *T. semivittata*. *Type.*

Holotype. British Museum. 47–74, N. Amer.; British Museum. Type No. Hem 969. Type examined.

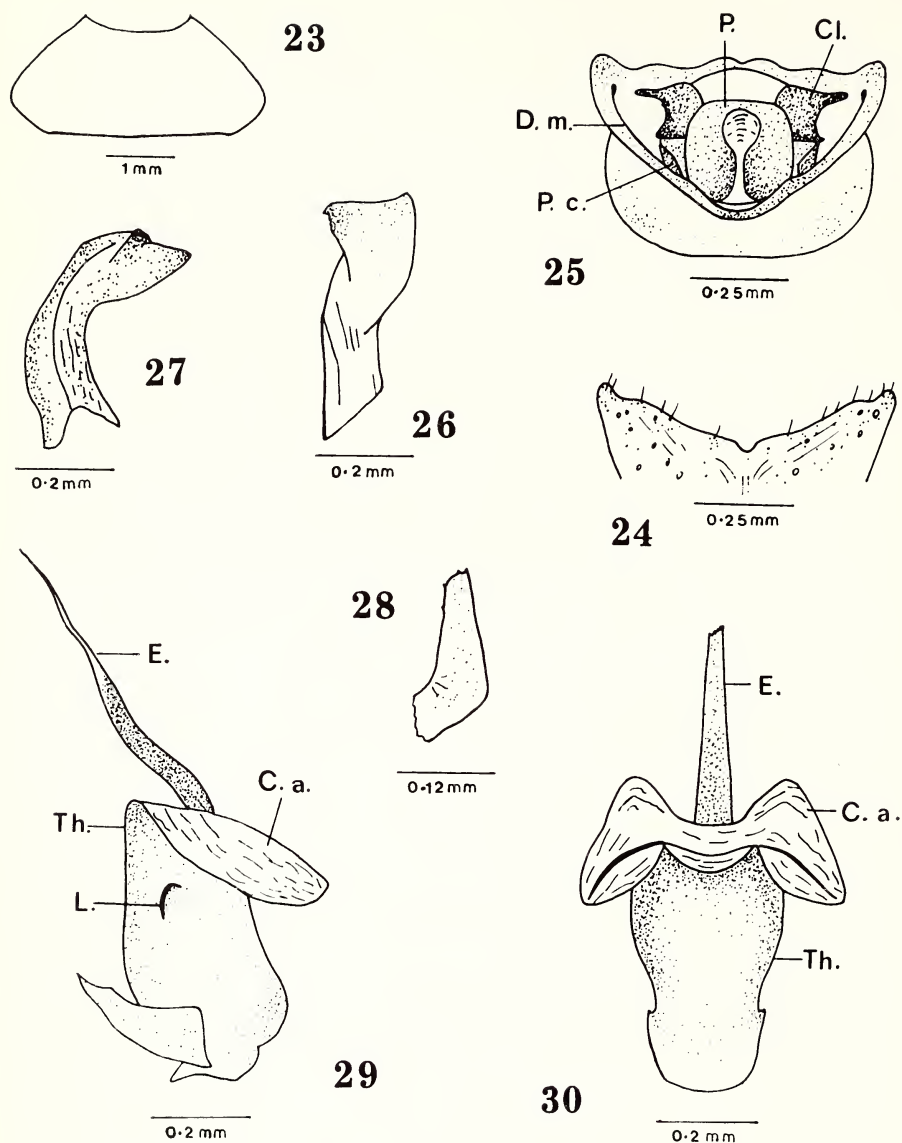
Distribution. Washington, California, Idaho, Utah, Arizona, Oregon, Colorado, Wyoming, British Columbia, Durango (Mexico).

Note. This species can be separated from *T. vandykei* by the following features. Ventral margin of pygophore with median notch (smooth in *vandykei*). Pronotum concolorous (distinctly striped yellow and black in *vandykei*).

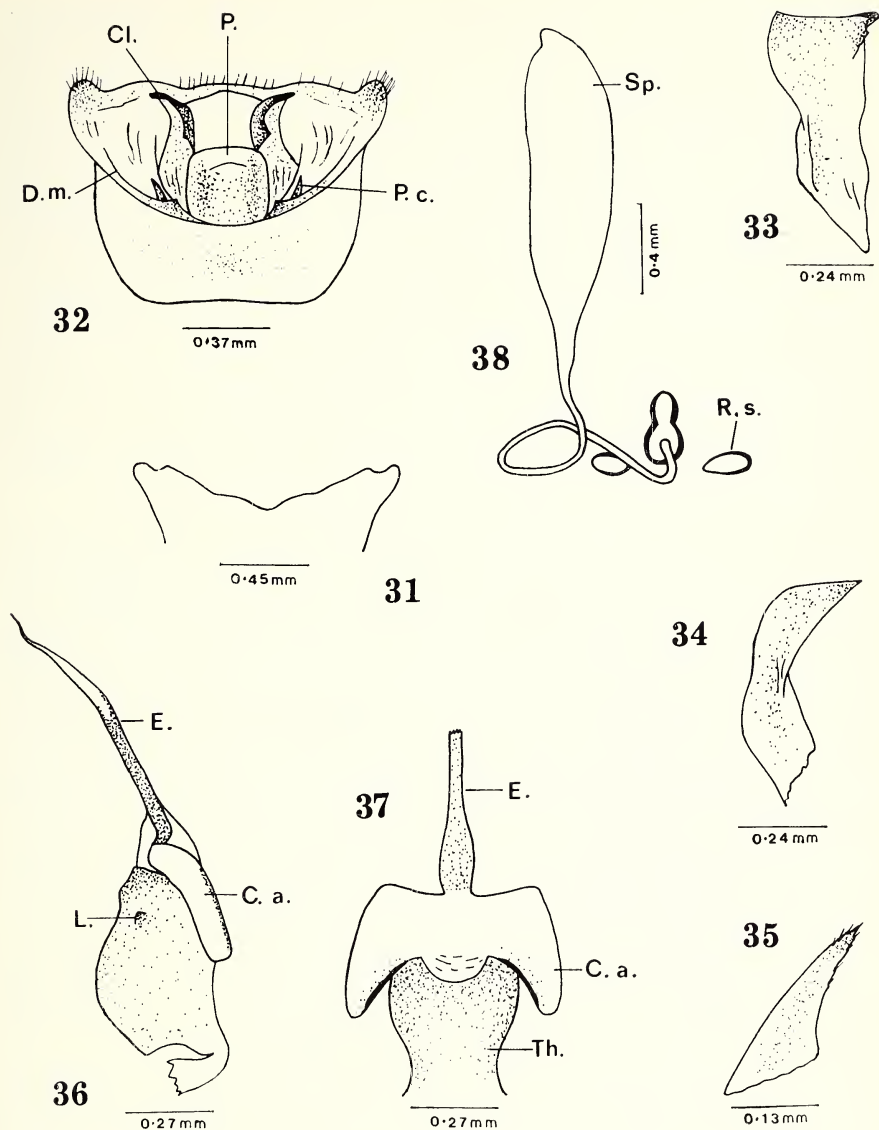
Trichopepla grossa Van Duzee, 1918, p. 274.

Trichopepla grossa Van Duzee, 1918, p. 274.

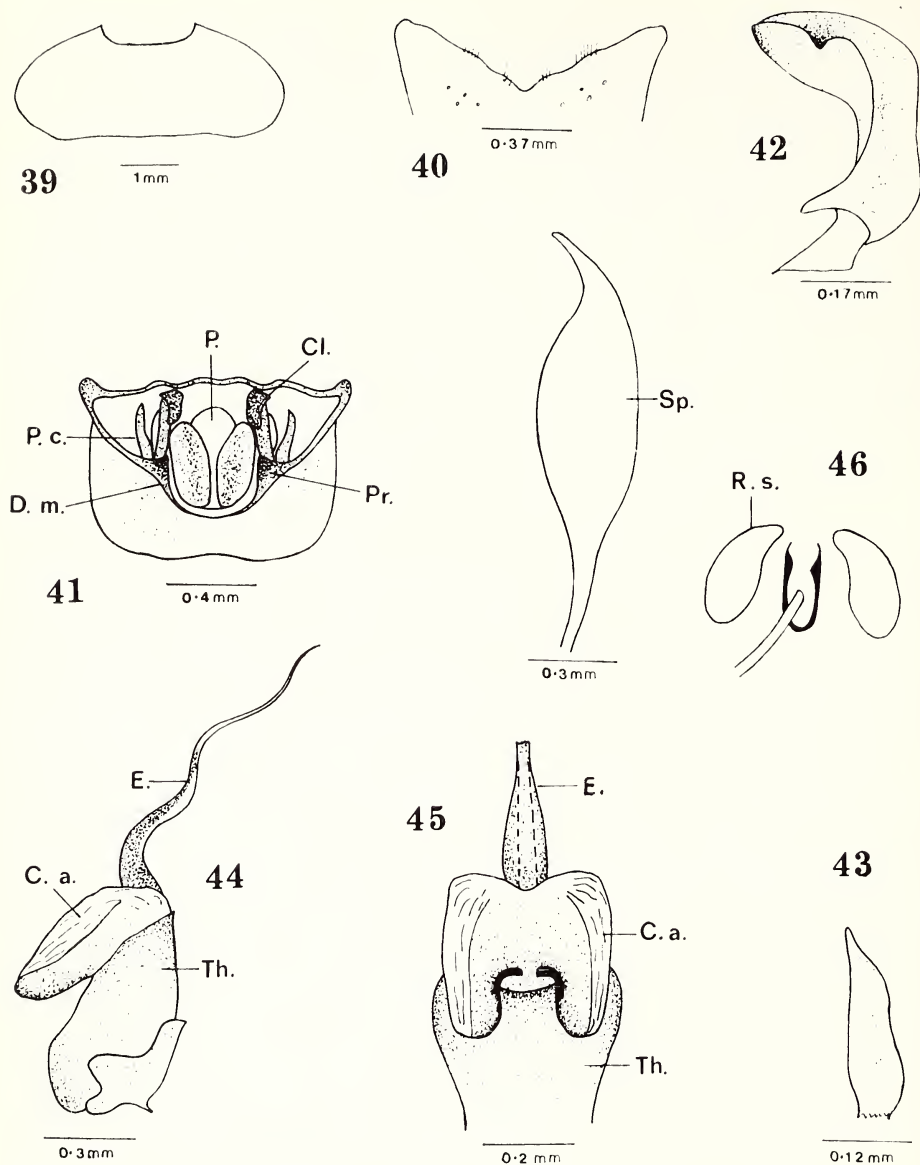
Large species, over 5 mm wide (across anterolateral angles of prothorax) and 8 mm long (tip of head to apex of membrane); dun coloured; 7 alternating broad stripes of black



FIGS. 23-30. *T. dubia*. 23. Pronotum. 24. Ventral margin of pygophore. 25. Pygophore, dorsal view. 26. Right clasper, outer view. 27. Right clasper, lateral view. 28. Left pseudo-clasper. 29. Aedeagus, lateral view. 30. Aedeagus, ventral view. Lettering as in previous diagrams.



FIGS. 31-38. *T. grossa*. 31. Ventral margin of pygophore. 32. Pygophore, dorsal view. 33. Left clasper, outer view. 34. Left clasper, lateral view. 35. Left pseudoclasper. 36. Aedeagus, lateral view. 37. Aedeagus, ventral view. 38. Spermatheca. Lettering as in previous diagrams.



FIGS. 39-46. *T. pleyto*. 39. Pronotum. 40. Ventral margin of pygophore. 41. Pygophore, dorsal view. 42. Left clasper, lateral view. 43. Left pseudoclasper. 44. Aedeagus, lateral view. 45. Aedeagus, ventral view. 46. Spermatheca. Protuberance (Pr.). Other lettering as in previous diagrams.

and pale brown radiating from apex of head onto anterior half of pronotum. Apex of scutellum generally with a pale yellow tip. Connexiva with a continuous pale yellow or light brown margin.

Male genitalia (Figs. 31-37). Pygophore. Ventral margin sinuous (Fig. 31). Dorsal margin with a broad central V-shaped emargination (Fig. 32). Proctiger oblong raised centrally. Claspers (Figs. 33, 34) C-shaped, apically expanded and spatulate. Pseudoclaspers (Fig. 35) triangular, a few fine setae present along margins. Aedeagus. Theca (Fig. 36) oblong with small projections one on each side near apical margins forming a shoulder; conjunctival appendages membranous, a narrow band of sclerotization on inner margins (Fig. 37). Vesica basally sclerotized, apically membranous and tapering to a fine point.

Female genitalia. External genitalia similar to *T. semivittata*. Spermatheca (Fig. 38) elongate, sac-like, with or without terminal appendix.

Type. Holotype. California Academy of Sciences, ♂ Castella, Cal. Coll. by J. A. Kusche. Paratypes, ♂ Juliaetta, Idaho; ♂ Market Lake, Idaho. Type examined.

Distribution. California, Idaho, S. Dakota, Oregon, Colorado.

Trichopepla pleyto Van Duzee, 1921

Trichopepla pleyto Van Duzee, 1921, p. 12.

Head broadly rounded, ratio of width (between eyes) to length (apex of head to line between base of eyes) 1:1. Lateral angles of pronotum broadly rounded (Fig. 39) and impressed behind anterolateral margins. Scutellum, ratio of width (at base) to length 1:1. Odoriferous gland sulcus crescent shaped, apex acute, anterior margin flush with metasternum.

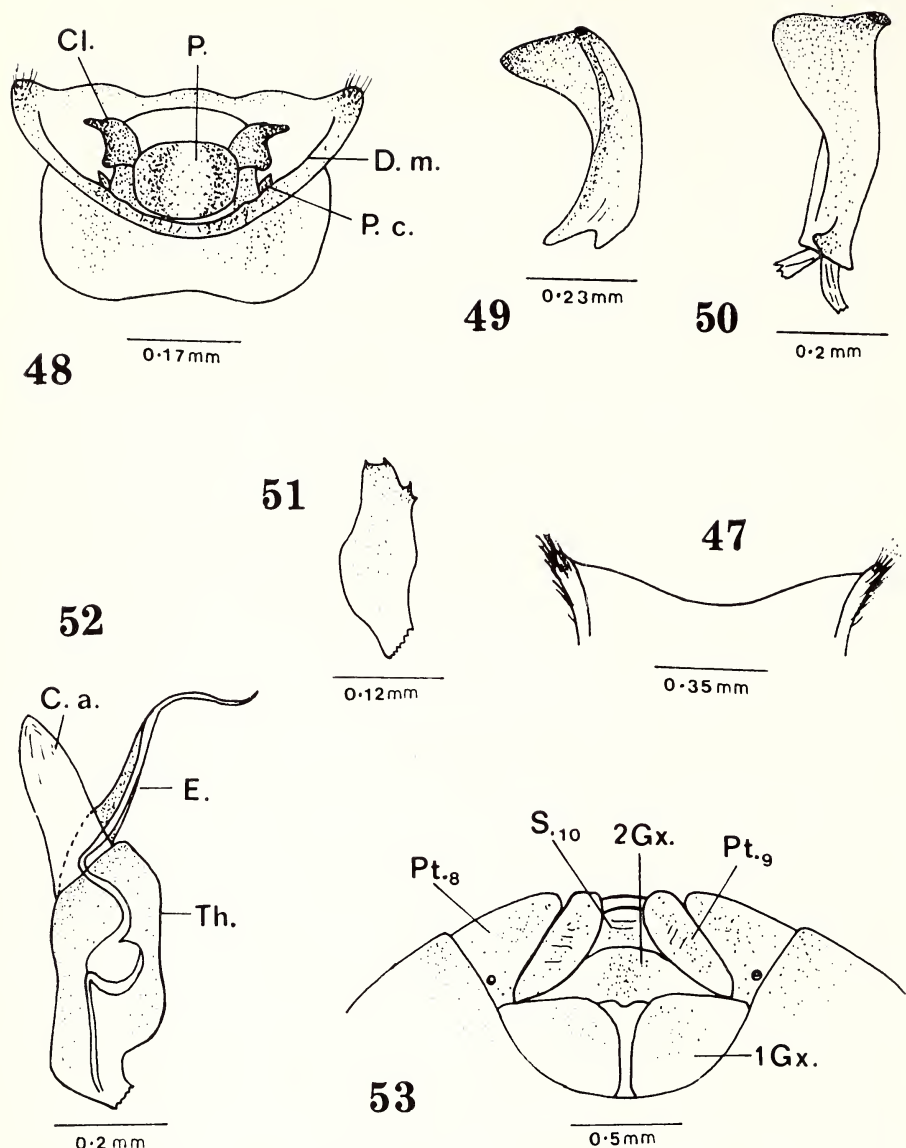
Male genitalia (Figs. 40-45). Pygophore. Ventral margin (Fig. 40) sinuous, widely V-shaped. Dorsal margin (Fig. 41) with a deep V-shaped emargination centrally and flanked by a stout protuberance one on each side; proctiger box-like. Claspers (Figs. 42, 43) broadly C-shaped, slightly expanded terminally and flattened; lower apical margin produced into a small process. Aedeagus. Theca (Fig. 44) vasiform, no lateral projections. Conjunctival appendages (Fig. 45) oblong, membranous, with a band of sclerotization on inner margins; endophallic duct sinuous, elongate, tapering to a fine point apically.

Female genitalia. External genitalia similar to *T. semivittata*. Spermatheca (Fig. 46) tapering apically; spermathecal duct opening surrounded by a U-shaped sclerite; ring sclerites large.

Type. Holotype. California Academy of Sciences; ♂ Bryson Ca. Monterey Co. May 19, 1920, E. P. Van Duzee Collector; Paratypes, ♂ Pleyto Cal. Monterey Co. May 21, 1920, E. P. Van Duzee Collector; ♂ Bradley Ca. Monterey Co. May 17, 1920, E. P. Van Duzee Collector.

Distribution. California, Chihuahua (Mexico) Mexico City, Baja California (Mexico).

Note. The following features distinguish this species from *T. dubia*. Lateral angles of pronotum broadly rounded (Fig. 39), rather more angulate in *T. dubia* (Fig. 23); ventral margin of pygophore smoothly U-shaped (border with a distinct median notch in *T. dubia*; dorsal margin with 2 distinct protuberances on either side of a deep U-shaped incision (more smoothly rounded in *T. dubia*).



FIGS. 47-53. *T. vandykei*. 47. Ventral margin of pygophore. 48. Pygophore, dorsal view. 49. Left clasper, lateral view. 50. Left clasper, inner view. 51. Left pseudoclasper. 52. Aedeagus, lateral view. 53. Female genitalia. Lettering as in previous diagrams.

Trichoepela vandykei Van Duzee, 1918

Trichoepela vandykei Van Duzee, 1918, p. 271.

Griscent to testaceous, broad alternating stripes of ground colour and black radiating from head to apical half of pronotum. Head broadly rounded apically. Base of scutellum

with three distinct buff stripes, one median two lateral interspersed with black or fuscous. Odoriferous gland sulcus crescent shaped, acute apically, anterior margin flush with metasternum.

Male genitalia (Figs. 47-52). Pygophore. Ventral margin smooth, gently concave (Fig. 47), a distinct tuft of setae on outer angles. Dorsal border (Fig. 48) smoothly arched. Claspers (Figs. 49, 50) C-shaped, apex flattened, spatulate and with a small finger-like projection on outer angle. Pseudoclaspers (Fig. 51) oblong, leaf-like with 3 or 4 minute marginal spines. Aedeagus. (Fig. 52). Similar to *T. pleyto*, conjunctival appendages with very little sclerotization on inner margins.

Female genitalia. Similar to *T. semivittata*, second gonocoxae slightly broader (Fig. 53). Spermatheca similar to *T. dubia*.

Type. Holotype. California Academy of Sciences, ♂ S. Francisco Co., 1X-16-06 Cal, Coll. by Van Dyke. Type examined.

Distribution. California.

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